State of California
AIR RESOURCES BOARD

EXECUTIVE ORDER D-97-8
Relating to Exemptions under Section 27156
of the Vehicle Code

BAE
TURBOCHARGER KIT NO. 28-0000-3

Pursuant to the authority vested in the Air Resources Board by Section 27156 of the Vehicle Code; and

Pursuant to the authority vested in the undersigned by Sections 39515 and 39516 of the Health and Safety Code and Executive Order G-45-5;

IT IS ORDERED AND RESOLVED: That the installation of the turbocharger Kit number 28-0000-3 manufactured by BAE, of 3032 Kashiwa Street, Torrance, California 90505, has been found not to reduce the effectiveness of required motor vehicle pollution control devices and, therefore, is exempt from the prohibitions of Section 27156 of the Vehicle Code for 1981 model year Volkswagen Rabbit, Dasher, Jetta, Pick-Up Truck, and Audi 4000 models having a 105 cubic inch displacement four-cylinder gasoline engine.

This Executive Order is valid provided that installation instructions for this device will not recommend tuning the vehicle to specifications different from those submitted by the device manufacturer.

Changes made to the design or operating conditions of the device, as exempted by the Air Resources Board, that adversely affect the performance of a vehicle's pollution control system shall invalidate this Executive Order.

Marketing of this device using an identification other than that shown in this Executive Order or marketing of this device for an application other than those listed in this Executive Order shall be prohibited unless prior approval is obtained from the Air Resources Board. Exemption of a kit shall not be construed as an exemption to sell, offer for sale, or advertise any component of a kit as an individual device.

This Executive Order does not constitute any opinion as to the effect that the use of this device may have on any warranty either expressed or implied by the vehicle manufacturer.

THIS EXECUTIVE ORDER DOES NOT CONSTITUTE A CERTIFICATION, ACCREDITATION, APPROVAL, OR ANY OTHER TYPE OF ENDORSEMENT BY THE AIR RESOURCES BOARD OF ANY CLAIMS OF THE APPLICANT CONCERNING ANTI-POLLUTION BENEFITS OR ANY ALLEGED BENEFITS OF THE BAE TURBOCHARGER KIT NO. 28-0000-3.

No claim of any kind, such as "Approved by Air Resources Board", may be made with respect to the action taken herein in any advertising or other oral or written communication.

Section 17500 of the Business and Professions Code makes untrue or misleading advertising unlawful, and Section 17534 makes violation punishable as a misdemeanor.

Section 43644 of the Health and Safety Code provides as follows:

> "43644. (a) No person shall install, sell, offer for sale, or advertise, or, except in an application to the state board for certification of a device, represent, any device as a motor vehicle pollution control device for use on any used motor vehicle unless that device has been certified by the state board. No person shall sell, offer for sale, advertise, or represent any motor vehicle pollution control device as a certified device which, in fact, is not a certified device. Any violation of this subdivision is a misdemeanor."

Any apparent violation of the conditions of this Executive Order will be submitted to the Attorney General of California for such action as he deems advisable.

Executed at El Monte, California, this 16th day of October, 1981.

K. D. Drachand, Chief
Mobile Source Control Division

State of Californi
AIR RESOURCES BOARD

Staff Report

October 9, 1981

Evaluation of the BAE Turbocharger Kit No. 28-0000-3 for Compliance with the Requirements of Section 27156 of the Vehicle Code

I. INTRODUCTION

BAE, of 3032 Kashiwa Street, Torrance, California 90505, has applied for an exemption of a turbocharger kit from the prohibitions of Section 27156 of the Vehicle Code (V.C.). The kit, turbocharger kit number 28-0000-3, is intended for 1981 model year Volkswagen Rabbit, Dasher, Jetta, Pick-Up Truck, and Audi 4000 models having a 105 cubic inch displacement (CID) four-cylinder gasoline engine.

BAE has supplied a test vehicle and applicable turbocharger kit for comparative exhaust emissions testing at the Air Resources Board (ARB) laboratory in El Monte, California. Testing consisted of cold-start CVS-75 and hot-start HFET tests.

II. TURBOCHARGER KIT DESCRIPTION

The purpose of turbocharging is to increase the volumetric efficiency of an engine by forcing more air into an engine than it would take in under naturally aspirated conditions.

The major components of the turbocharger kit are a Rajay Turbocharger Model No. 300B, a replacement BAE exhaust manifold, and intake, discharge, and exhaust pipes. The components are packaged with installation hardware and instructions and sold as a kit.

The original equipment manufacturer (OEM) exhaust manifold is replaced by a BAE manifold. The turbine inlet mounts directly to the replacement manifold. The turbine, driven by exhaust gases, is linked to the compressor by a solid shaft. Intake air from the air box, of the K-Jetronic System, is routed through the intake pipe to the compressor. Compressed air is then piped through the discharge pipe to the intake plenum.

Lubrication of the turbocharger is provided by a steel-braided line from the oil filter adaptor to the turbocharger bearing housing. Oil from the turbocharger is returned to the oil pan.

Maximum positive manifold pressure (boost) is limited to 5 psig by a wastegate positioned on the exhaust manifold. The wastegate is preset to dump excess exhaust gases when intake manifold pressure reaches 5 psig of boost.

A vacuum-delay valve is used to control NOx exhaust emissions and to suppress detonation. The valve is installed in the vacuum line prior to the vacuum retard mechanism of the distributor.

No modifications to the OEM tune-up specifications are required when the turbocharger kit is installed. All OEM emission controls are left intact.

III. TEST PROGRAM

A 1981 Volkswagen Pick-Up truck with a four-cylinder gasoline engine and five-speed manual transmission was used for testing. The certification test weight is 2500 lbs. The road load horsepower used in the testing was 9.8 HP.

Testing at the ARB laboratory consisted of cold-start CVS-75 and hot-start HFET tests to determine exhaust emissions of the unmodified (baseline) and turbocharged (device) configurations for comparison.

IV. TEST DATA

The emissions test data is shown in the following table:

Test		Exhaust Emissions (g/mi) HC	CO	NOx	Fuel Economy (mpg)
Baseline	CVS-75	0.28	3.22	0.18	20.8
Baseline	CVS-75	0.25	2.95	0.17	21.0
Baseline	CVS-75	0.24	2.81	0.21	21.1
Average		0.25	2.99	0.19	21.0
Device	CVS-75	0.22	2.03	0.10	21.7
Device	CVS-75	0.25	2.25	0.14	21.3
Device	CVS-75	0.23	2.13	0.15	21.1
Average		0.23	2.14	0.13	21.4
Baseline	HFET	0.09	1.78	0.09	31.7
Baseline	HFET	0.11	1.98	0.12	31.0
Baseline	HFET	0.12	1.54	0.08	31.2
Average		0.11	1.77	0.10	31.3
Device	HFET	0.08	1.52	0.09	35.1
Device	HFET	0.08	1.68	0.10	33.5
Device	HFET	0.08	1.70	0.10	33.3
Average		0.08	1.64	0.10	34.0

V. DISCUSSION

The two sets of CVS-75 and HFET comparative emissions tests show that the emissions of the test vehicle are not adversely affected by the installation of the turbocharger kit.

VI. CONCLUSION AND RECOMMENDATION

Comparative emissions tests indicate that the BAE turbocharger kit number 28-0000-3 will not adversely affect emissions when installed in accordance with the manufacturer's instructions. The staff recommends that BAE be granted an exemption from the prohibitions of V.C.

Section 27156 for this kit for 1981 model year Volkswagen Rabbit, Dasher, Jetta, Pick-Up Truck, and Audi 4000 models having a 105 CID four-cylinder gasoline engine. The staff, therefore, recommends that Executive Order No. D-97-8 be adopted.